# PATENT COOPERATION TREATY

# PCT

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



| Applicant's or agent's file reference 12585250/DH/gjm | FOR FURTHER ACTION | See Form PCT/IPEA/416 |
|---|---|---|
| International application No. PCT/AU2004/001428 | International filing date *(day/month/year)* 20 October 2004 | Priority date *(day/month/year)* 20 October 2003 |

International Patent Classification (IPC) or national classification and IPC

Int. Cl.

***B63H 23/30*** (2006.01) ***F16D 25/0638*** (2006.01) ***F16D 48/06*** (2006.01)

Applicant

NAUTITECH PTY LTD et al

1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
3. This report is also accompanied by ANNEXES, comprising:
   a. [X] *(sent to the applicant and to the International Bureau)* a total of 5 sheets, as follows:
      - [X] sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).
      - [X] sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.

   b. [ ] *(sent to the International Bureau only)* a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or table related thereto, in electronic form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).

4. This report contains indications relating to the following items:

| | | |
|---|---|---|
| [X] | Box No. I | Basis of the report |
| [ ] | Box No. II | Priority |
| [X] | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| [ ] | Box No. IV | Lack of unity of invention |
| [X] | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| [ ] | Box No. VI | Certain documents cited |
| [ ] | Box No. VII | Certain defects in the international application |
| [ ] | Box No. VIII | Certain observations on the international application |

| Date of submission of the demand | Date of completion of this report |
|---|---|
| 19 August 2005 | 09 February 2006 |
| Name and mailing address of the IPEA/AU<br>AUSTRALIAN PATENT OFFICE<br>PO BOX 200, WODEN ACT 2606, AUSTRALIA<br>E-mail address: pct@ipaustralia.gov.au<br>Facsimile No. (02) 6285 3929 | Authorized Officer<br>**S.J. DESCHANEL**<br>Telephone No. (02) 6283 2368 |

**Box No. I Basis of the report**

1. With regard to the language, this report is based on:

[X] The international application in the language in which it was filed

[ ] A translation of the international application into , which is the language of a translation furnished for the purposes of:

[ ] international search (under Rules 12.3(a) and 23.1 (b))

[ ] publication of the international application (under Rule 12.4(a))

[ ] international preliminary examination (Rules 55.2(a) and/or 55.3(a))

2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

[ ] the international application as originally filed/furnished

[X] the description:

pages **1, 3-5** as originally filed/furnished
pages* **2, 2a** received by this Authority on **19 August 2005** with the letter of 19 August 2005
pages* received by this Authority on with the letter of

[X] the claims:

pages as originally filed/furnished
pages* as amended (together with any statement) under Article 19
pages* **6-8** received by this Authority on **19 August 2005** with the letter of 19 August 2005
pages* received by this Authority on with the letter of

[X] the drawings:

pages **1/3-3/3** as originally filed/furnished
pages* received by this Authority on with the letter of
pages* received by this Authority on with the letter of

[ ] a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing.

3. [ ] The amendments have resulted in the cancellation of:

[ ] the description, pages
[ ] the claims, Nos.
[ ] the drawings, sheets/figs
[ ] the sequence listing *(specify)*:
[ ] any table(s) related to the sequence listing *(specify)*:

4. [X] This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

[ ] the description, pages
[X] the claims, Nos.15-17
[ ] the drawings, sheets/figs
[ ] the sequence listing *(specify)*:
[ ] any table(s) related to the sequence listing *(specify)*:

* *If item 4 applies, some or all of those sheets may be marked "superseded."*

**Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability**

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application

☐ claims Nos: **1-8, 18**

because:

☐ the said international application, or the said claims Nos.
relate to the following subject matter which does not require an international preliminary examination *(specify)*:

☐ the description, claims or drawings *(indicate particular elements below)* or said claims Nos.
are so unclear that no meaningful opinion could be formed *(specify)*:

☐ the claims, or said claims Nos.
are so inadequately supported by the description that no meaningful opinion could be formed *(specify)*

☒ no international search report has been established for said claim Nos. **1-8, 18**

☐ A meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

- ☐ Furnish a sequence listing on paper complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.
- ☐ Furnish a sequence listing in electronic form complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Preliminary Examining Authority in a form and manner acceptable to it.
- ☐ Pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rules 13*ter*.1(a) or (b) and 13*ter*.2.

☐ A meaningful opinion could not be formed without the tables related to the sequence listings; the applicant did not, within the prescribed time limit, furnish such tables in electronic form complying with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions, and such tables were not available to the International Preliminary Examining Authority in a form and manner acceptable to it

☐ the tables related to the nucleotide and/or amino acid sequence listing, if in electronic form only, do not comply with the technical requirements provided for in Annex C-*bis* of the Administrative Instructions.

☐ See Supplemental Box for further details.

**Box No. V** **Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1. Statement

| | | | |
|---|---|---|---|
| Novelty (N) | Claims | 9-14 | YES |
| | Claims | | NO |
| Inventive step (IS) | Claims | | YES |
| | Claims | 9-14 | NO |
| Industrial applicability (IA) | Claims | 9-14 | YES |
| | Claims | | NO |

2. Citations and explanations (Rule 70.7)

D1: US 5474480

D2: US 3548987

D3: US 4305710

Claims 9-14 meet the requirements of novelty and industrial applicability.

Inventive step (IS) claims 9-14

It is considered that the invention as defined in claims 9-14 lacks inventive step in the light of each of the above documents or obvious combinations of the above documents. Each of these documents discloses a decoupling clutch system for use in a marine craft. The clutches have input shafts for operative connection to drive shafts and are arranged to drive output shafts operatively connected to propellers. Each document discloses a control system arranged to control slippage of the clutch.

While each of the documents may differ from the invention of the claims in certain respects it is considered that such features are merely matters of common general knowledge or could readily be included by a person skilled in the art if the circumstances so suggested. For instance, although D1 and D2 have incorporated the clutch or clutches in gearboxes it is considered that a person skilled in the art could contemplate keeping the clutches separate if such was desirable. Furthermore, it would readily occur to a person skilled in the art to combine the teachings of D1 or D2 with D3. Similarly it is considered that the explicit teachings of D2 of controlling slippage of the clutch according to speeds of input and output shafts could readily be used by a person skilled in the art to augment the disclosures of D1 or D3.

**Supplemental Box**

**In case the space in any of the preceding boxes is not sufficient.**

Continuation of: Box 1

The amendments to claims 15-17 are considered to go beyond the disclosure as filed because the feature: "a clutch having a single clutch area" has been excluded. In describing the first broad aspect of the invention on page 2, the specification describes that the clutch "has a single clutch area" with

"The advantage of having a single clutch area is that the clutch may be slipped at any speed or torque", which is directly related to overcoming the described problem of the prior art and is consistent with the description of the specification as a whole.

**Summary of the Invention**

In a first broad aspect, there is provided a watercraft with an engine and a clutch having a clutch casing and an output for transmitting drive from the engine to a transmission of the watercraft, wherein the casing is fitted to the engine and the clutch is operable for controlled slippage to allow torque applied to the output to be varied.

In another aspect, there is provided a clutch including an input shaft, an output and clutch means operable for controlled slippage to allow torque applied to the output to be varied, wherein the clutch includes a clutch casing for attachment to an engine of a watercraft.

The advantage of having a clutch is that the clutch may be slipped at any speed or torque. This also allows for high energy launches and driveline protection.

A control system is provided for controlling slippage of the clutch. The slip speed of the clutch is controlled by monitoring both the input shaft speed and the output propeller speeds. The output speed may be used as an input to control the slip speed, allowing for clutch slip at any speed and torque.

This in one preferred aspect, the present invention provides a decoupling clutch system for use in a marine craft, the system including a decoupling clutch having a single clutch area and being separate from and not associated with a gearbox or the like, the decoupling clutch system including an input shaft for operative connection to a drive shaft of the marine craft, and being arranged to drive, via the decoupling clutch, an ouput shaft which, in use, is operatively connected to a propeller, jet drive or the like of the marine craft, the decoupling clutch system further including a piston or the like for controlling engagement of the clutch, a control system, means for monitoring the input shaft speed and transmitting the input shaft speed to the control system, means for monitoring the output shaft speed and transmitting the output shaft speed to the control system, the control system being arranged to control slippage of the clutch by monitoring both the input shaft speed and the output shaft speeds and adjusting the engaging forces on the clutch to adjust clutch slippage accordingly.

The decoupling clutch typically includes an input shaft and friction plates which are splined to the input shaft. Drive is provided to the output shaft through clutch plates which are splined to a clutch drum which is in turn, splined to an output shaft. Alternatively the

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output shaft and input shaft may be reversed, with the friction plates splined to the output shaft. A piston or the like may be provided to force the friction plates and clutch plates together to transfer drive from the input shaft to the output shaft.

In a preferred embodiment the force provided by the piston is controlled by controlling the pressure in the piston using direct acting high flow electro hydraulic

CLAIMS:

1. A watercraft with an engine and a clutch having a clutch casing and an output for transmitting drive from the engine to a transmission of the watercraft, wherein the casing is fitted to the engine and the clutch is operable for controlled slippage to allow torque applied to the output to be varied.

2. A watercraft as claimed in claim 1, wherein an input of the clutch is coupled to a flywheel of the engine.

3. A watercraft as claimed in claim 2, wherein a damper is provided between the flywheel and input.

4. A watercraft as claimed in claim 2 or 3, wherein the casing is dimensioned to accommodate the flywheel.

5. A clutch including an input shaft, an output and clutch means operable for controlled slippage to allow torque applied to the output to be varied, wherein the clutch includes a clutch casing for attachment to an engine of a watercraft.

6. A clutch as claimed in claim 5, wherein the input shaft is arranged to couple directly to an engine output when the clutch casing is attached to the engine.

7. A clutch as claimed in claim 5, wherein the clutch further includes a damper arranged to couple between the input shaft and the engine output.

8. A clutch as claimed in claim 6 or 7, wherein the casing is dimensioned to accommodate the engine output when the clutch is attached to the engine.

9. A decoupling clutch system for use in a marine craft, the system including a decoupling clutch having a single clutch area and being separate from a gearbox or the like, the decoupling clutch system including an input shaft for operative connection to a drive shaft of the marine craft, and being arranged to drive, via the decoupling clutch, an output shaft which, in use, is operatively connected to a propeller, jet drive or the like of the marine craft, the decoupling clutch system further including a piston or the like for controlling engagement of the clutch, a control system, means for monitoring

the input shaft speed and transmitting the input shaft speed to the control system, means for monitoring the output shaft speed and transmitting the output shaft speed to the control system, the control system being arranged to control slippage of the clutch by monitoring both the input shaft speed and the output shaft speeds and adjusting the engaging forces on the clutch to adjust clutch slippage accordingly.

10. A decoupling clutch system as claimed in claim 9 wherein the engaging force on the clutch provided by the piston is controlled by controlling the pressure in the piston using direct acting high flow electro hydraulic solenoids.

11. A decoupling clutch system as claimed in claim 9 or 10 including a biasing means such as a spring or the like, biased to disengage the clutch.

12. A decoupling clutch system as claimed in claim 9 or 10, including a biasing means such as a spring or the like, biased to engage the clutch.

13. A decoupling clutch system as claimed in any one of claims 9 to 12 wherein friction plates are splined to the input shaft and drive is provided to the output shaft through clutch plates which are splined to a clutch drum which is splined to the output shaft.

14. A decoupling clutch system as claimed in any one of claims 9 to 12 wherein friction plates are splined to the output shaft and drive is provided from the input shaft through clutch plates which are splined to a clutch drum which is splined to the input shaft.

15. A watercraft including a drive unit including an engine and a transmission and an output shaft to a propeller, jet drive, or the like characterised by a decoupling clutch system including a clutch being separate from a gearbox or the like and having an input shaft operatively connected to a drive shaft of the marine craft, and being arranged to drive, via the decoupling clutch, an output shaft which is operatively connected to a propeller, jet drive or the like of the marine craft, the decoupling clutch system further including a piston or the like for controlling engagement of the clutch, a control system, means for monitoring the input shaft speed and transmitting the input shaft speed to the control system, means for monitoring the output shaft speed and transmitting the output shaft speed to the control system, the control system being

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arranged to control slippage of the clutch by monitoring both the input shaft speed and the output shaft speeds and adjusting the engaging forces on the clutch to adjust clutch slippage accordingly.

16. A decoupling clutch system as claimed in claim 15 wherein the engaging force on the clutch provided by the piston is controlled by controlling the pressure in the piston using direct acting high flow electro hydraulic solenoids.

17. A decoupling clutch system as claimed in claim 15 or 16 including a biasing means such as a spring or the like, biased to disengage the clutch.

18. A clutch as claimed in any one of claims 1 to 17, having the ability to control high energy torque transfers.